

Chute size

NASA has added a drag chute to its space shuttle production contract for *Endeavour*. Story on Page 4.



Badge etiquette

JSC Security is reminding employees that they are required to wear their badges while on site. Story on Page 4.

# Space News Roundup

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No. 2

## Chief astronaut tells of life in commander's seat

*Editor's note: This article has been abridged. The complete text will appear in the November-December 1990 issue of NASA Activities.*

By James Hartsfield

Dawn breaks on another hot Florida summer day at the Kennedy Space Center. For a place filled with high-tech, heavy industry, the site is eerily quiet.

Contrasted to the gulls that circle overhead, the space shuttle is graceless, ungainly and out of its element.

One can see it from all angles.

From one view, it is a machine, polished, processed and ready, a

composite of hundreds of small and large mechanisms.

From another side, it is the fruit of a thousand careers. In its carbon-carbon tipped nose are the most innovative years of numerous lives. In the curve of its wings are still more years and lives spent calculating, drawing, designing, and testing.

But for all these angles that the world can see, only one person at a time can see this machine truly do its job. The left-hand seat is a single seat, and only an individual can know how it flies or what it is like.

He is at the controls and in command, and by the time he takes his

seat, he is engrossed in the complexity of the machine and the task it will perform. Dan Brandenstein, chief of the Astronaut Office, has taken that seat for two flights, and ridden next to it once. Along with the responsibility a commander carries on board, he carries another when he returns: to describe his journey to the thousands that made it happen.

"When you've had the opportunity to work with the shuttle and fly it, you get a real appreciation for the total team," Brandenstein says. "You really see how broad a scope of folks are involved in it and just how complex it is."

When the silent clock strikes zero,

more than 250 NASA television and film cameras are trained on the shuttle. Commercial television cameras line platforms three miles away, and the scenes on which they focus are transmitted to every major American network. Still cameras are planted remotely in the swamps around the launch pad; even more cameras click in a press grandstand. And no one counts those that line the roads for miles around.

At ignition, the solid rockets go from zero to 44 million horsepower in a split second. The main engines produce a power equal to that generated by 23 Hoover Dams.

But all the eyes that study it as a spectacle, both electronic and human, can't see it from the perspective of that single, front left seat.

"You know, I've flown three times on the shuttle, but I've probably looked out the window for only two or three glances on ascent," Brandenstein says. "You are really focused on making sure the vehicle is operating properly. In that dynamic a region, if it starts to do something wrong, you can't be hesitant. You know what the limits are and when you are going to have to take over manually if something happens."

Please see **COMMAND**, Page 3



JSC Photo by Andrew Patnesky

STS-39 Mission Specialist Greg Harbaugh gets a chance to visit with his wife, Carol, and daughters while suiting up for a training exercise in the Weightless Environment Training Facility. Visiting "daddy" are camera-shy Kelly Allison, almost 2, and Dana Claire, 6 months.

## Discovery slightly ahead of schedule

By James Hartsfield

*Discovery*, slightly ahead of schedule for an early March launch of STS-39 at Kennedy Space Center, is to be moved to the Vehicle Assembly Bldg. to be linked with the solid rocket boosters and external tank late this month.

Work on *Discovery* this week, in Bay 1 of the Orbiter Processing Facility, included checkouts of the auxiliary power units, checkouts of the forward reaction control system and orbital maneuvering system, installation of heat shields around the main engines, and interface tests between parts of the Infrared Background Signature Survey payload.

On *Atlantis*, in the OPF's Bay 2, tests of the remote manipulator system (RMS) were successful this week. Also, windows 1 and 6 are being replaced due to blemishes

on them. Late this week, work on the orbiter's hydraulic systems was planned. *Atlantis* is being readied for launch in April on STS-37 to deploy the Gamma Ray Observatory.

In the VAB, post-flight work is under way on *Columbia*, recently returned from STS-35. That work has included removal of the two failed Spacelab Data Display Units used during STS-35. Analysis of the units, still under way, so far has shown that problems with both stemmed from faulty components in the main power supply. Blockage in the cooling ducts for the computer terminals also is being studied. The two units have been repaired and are being further tested.

Elsewhere at KSC, the Tethered Satellite System payload, slated for flight on STS-46 in March 1992, is being assembled in the payload Operations and Checkout Bldg.



## Expert says quality best pathway to productivity

By Kelly Humphries

One of the foremost American experts on productivity shared sobering economic warning signs with JSC employees Tuesday, but offered hope through Total Quality Management.

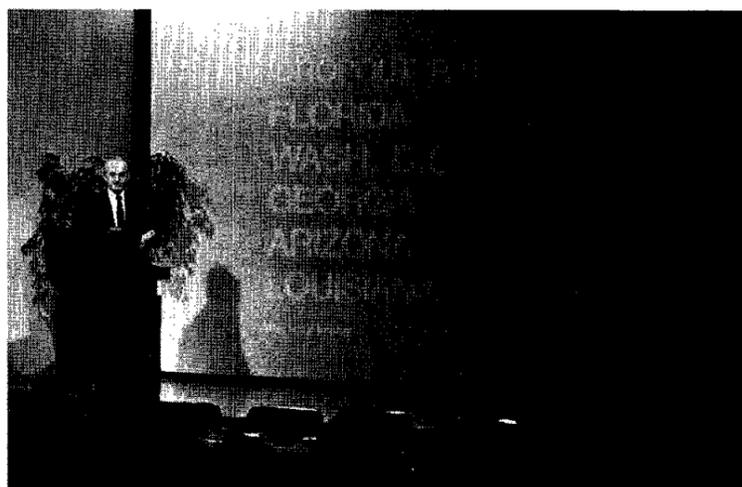
Dr. C. Jackson Grayson, founder of the American Productivity and Quality Center in Houston, told participants in a NASA-wide video colloquium broadcast from JSC's Bldg. 30 auditorium that the key to success in any organization is productivity. The best route to productivity is quality, he said, and the best route to quality is Total Quality Management.

"It's organized common sense," he said of the integrated set of principles,

processes and techniques that NASA Administrator Richard Truly and JSC Director Aaron Cohen have adopted in an effort to improve NASA's products, services and processes. "That is its power. It is not something radically new that just landed from outer space. . . . Our common sense, organized, is very powerful — particularly if we are teaming with other people who have a lot of common sense."

Before talking about TQM, Grayson gave audience members a quiz on where America stands in relation to other countries when it comes to productivity. The statistics he produced

Please see **EXPERT**, Page 4



JSC Photo by Benny Benavides

Dr. C. Jackson Grayson, head of the American Productivity and Quality Center in Houston, tells JSC that America is losing its economic world leadership.

## Top executive honors go to JSC managers

By Kelly Humphries

Six high-level JSC managers Wednesday were tapped to receive 1990 Presidential Rank Meritorious Executive Awards, the second highest honors given to government executives.

President George Bush announced the presentation of the awards to JSC Deputy Director Paul Weitz, JSC Associate Director Dan Nebrig, Administration Director Bill Kelly, Space and Life Sciences Director Carolyn Huntoon, Information Systems Director Ron Berry and Space Station Freedom Program and Operations Integration Manager Dick Thorson.

Former long-time JSC employees Arnold Aldrich, NASA associate administrator for the Office of Aerospace, Exploration and Technology, and Richard Kohrs, director of the Space Station Freedom

Program, received Distinguished Executive Awards, the highest award for government executives.

NASA's 1990 recipients will be recognized at a Jan. 16 reception hosted by NASA Administrator Richard Truly at Kennedy Space Center.

Weitz has been JSC deputy director since 1986, sharing responsibility for program management of the space shuttle, elements of Space Station Freedom and Lunar/Mars exploration programs. He began his government career as a naval aviator, retiring as a captain in 1976 after 12 years of service. He joined the astronaut corps at JSC in 1966, was pilot on the Skylab 2 crew that spent 28

days in orbit in 1973, and commanded STS-6, the maiden voyage of the Space Shuttle *Challenger* in 1983.

Please see **JSC**, Page 4



Weitz



Nebrig



Kelly



Huntoon



Berry



Thorson

## Astronaut Fisher resigns, returns to medical world

By Barbara Schwartz

Astronaut William F. Fisher, M.D., said Tuesday he will resign from NASA effective Jan. 31 and return to the full-time practice of medicine as an emergency specialist at Humana Hospital-Clear Lake.

Selected by NASA in 1980, Fisher was a mission specialist on STS-511 in August 1985. During that flight, the crew deployed three communication satellites, then performed a successful on-orbit rendezvous with the ailing 15,400-pound SYNCOM IV-3 satellite. Fisher and Astronaut James van Hoften performed two extravehicular

Please see **FISHER**, Page 4

JSC

## Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m.-2 p.m. weekdays.  
 General Cinema (valid for one year): \$4 each.  
 AMC Theater (valid until May 1991): \$3.50 each.  
 Thermographed: Raised lettering and logo business cards can be ordered by civil service employees; 250 cards per set. Old logos-\$21; new logos-\$18.  
 Stamp books (20-\$.25 stamps): \$5.

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## Gilruth Center News

**Sign up policy**—All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a badge or EAA membership card. Classes tend to fill up four weeks in advance.

**EAA badges**—Dependents and spouses may apply for a photo I.D. 6:30-9 p.m. Monday-Friday.

**Defensive driving**—Course is offered from 8 a.m.-5 p.m., Jan. 26. or Feb. 16. Cost is \$15.

**Aerobics and exercise**—Both classes are on-going.

**Ballroom dancing**—Eight-week courses for beginners, beginner-intermediate, intermediate and advanced students began Jan. 3. Cost is \$60 per couple.

**Weight safety**—Required course for employees wishing to use the Gilruth weight room. The next classes will be Jan. 17, and Jan. 30 from 8-9:30 p.m. Cost is \$4.

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## Technical Library News

The following selections are now available in JSC's Technical Library, Bldg. 45, Rm. 100.

*Directory of Federal Laboratory and Technical Resources: A Guide to Services, Facilities and Expertise*, 1990. Q179.98.D57

*Numerical Recipes in Pascal: The Art of Scientific Computing*, 1989. QA76.73.P2 R87 1989.

*Celestial BASIC: Astronomy on Your Computer*, Eric Burgess, 1982. QB51.3.E43 B87.

*The Transfer of Remote Sensing Technology to Developing Countries: The Landsat Experience*, Christine Specter, 1986. AS36.G3 1986.

*Doing It Now: A Twelve-Step Program for Curing Procrastination and Achieving Your Goals*, Edwin C. Bliss, 1983. BF575.P95 B57 1983.

*The Neuropsychology of Self-Discipline: The Master Key to Success* (sound recording), Sybervision, 1985. BF632.N8 1985.

*Negotiate Like the Pros* (sound recording), John Dolan, 1990. BF637.N4 N43 1990.

*Overcoming Procrastination* (sound recording), Susan Woodring, 1990. BF637.P76 1987.

*Personal Power: How to Project Confidence from the Inside Out*, Lisa Ford, 1987. BF1533.S27 F67 1987.

*The Politics of Technological Change: A History of Landsat*, Pamela Mack, 1983. G70.4.M34 1983.

*Remote Sensing Yearbook 1986*, 1986. G70.4.R45 1986.

*Remote Sensing and the Private Sector: Issues for Discussion, Congressional Office of Technology Assessment*, 1984. G70.5.U6 R454 1984.

*System Concept for Wide-Field-of-View Observations of Ocean Phenomena from Space*, NASA, 1987. GC10.4.R4 S9 1987.

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## Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2. No phone or fax ads accepted.

### Property

**Sale:** Galv. condo, Seawall Blvd. & 61st, furn., sleeps 6, dly/wknd/wkly rates, cable. Magdi Yassa, x33479 or 486-0788.

**Lease:** Room in lg. house, 20 min. from NASA, \$270/mo., util. incl. Eric, x38420 or 484-9179.

**Rent:** CL townhouse, 2-2.5-2, FPL, all appli., gray carpet, fresh paint, \$800/mo., nonsmoking applicants. 488-2664.

**Rent:** Baywind I condo, 1 BR, new carpet/paint & wallpaper, avail. Jan. 1, '91, \$390/mo. x36353 or 480-9280.

**Rent:** Galv. condo, Seawall Blvd. & 61st, furn., sleeps 6, dly/wknd/wkly rates, cable. Magdi Yassa, x33479 or 486-0788.

**Sale:** Hot Spring Village, Ark., wooded lot, util., imp., \$9,800, OBO. 326-1254 or 333-6150.

**Sale:** Kerrville, TX, 12x60 mobile home, furn., good cond., lg. CP, lg. cov. patio, \$6K. 333-6150 or 326-1254.

**Sale:** Bayfront lot in Seabrook, \$125K; 2 waterfront lots near NASA, \$38,500/ea. Don, x38039 or 333-1751.

**Sale:** Friendswood, lg. lot, 120x162, near schools, all util. avail., \$34K. Rick, 283-1988 or 996-8961.

**Rent:** Baywind I condo, 2-2-2, 2nd floor, divided plan, FPL, drapes, \$450 plus dep. Su, 486-5621 or 335-2996.

### Cars & Trucks

'87 Nissan Sentra, 2-dr., auto., new tires, tuneup, oil change, ex. cond., \$4,500. James, 487-3223.

'89 Camaro IROC-2 convert., loaded, ext. 100K mi. warr., ex. cond., 28K mi. 762-8859 or 338-0021.

'87 Grand Am, air, auto., 4-dr., low mi., \$5,975. x36252 or 358-9598.

'86 Toyota Camry, white 4-dr., ex. cond., AC, auto., AM/FM/cass., tilt, cruise, orig. owner, non smoker, 64K mi., \$5,997. 474-3507.

'87 Nissan 300 ZX, T-tops, 5-spnd., ster. tape,

low mi., garaged, \$11,500. 771-0955.

'88 Cutlass Supreme International, 2-dr. Spt. Coupe, 2.8 multiport fuel inj., pwr., 37K mi., \$8,800, OBO. Kirk, 282-2911 or 332-5876.

'86 Buick Regal Ltd., pwr., V8, 70K mi., ex. cond., \$5,800, OBO. 282-4041 or 337-2318.

'85 Cadillac Limo, ex. cond., Diane, 471-5291.

'85 Chevy S-10 Blazer, V6, auto., good AC, good tires, 63K mi., \$5,700, OBO. x31913 or 486-9488.

'82 Mercury Lynx A2B, some rust, leaks, \$500. Carl, x31559 or 338-1290.

'88 Toyota Camry LE, pwr. sunroof/moonroof, loaded, 6 yr./75K mi. ext. warr., 36K mi., ex. cond., \$10,700, OBO. Brian, 283-4126 or 996-9415.

'87 Chevy S-10 Blazer, ex. cond., 4-spnd., 4-cyl., \$5,500. 470-0777.

'84 LTD 4-dr., V6 w/EFI, auto., air, good cond., 100K mi., \$2K. Phil or Crista, 474-7409.

'86 Mazda 626LX, 2-dr., dk. blue, pwr., auto. 480-2264.

### Cycles

'82 Yamaha Virago, blk., 8.2K, ex. cond., shaft drive. Roger, x31928 or 996-7674.

'87 Kawasaki KLR-650, multi-purpose, 6K mi., liq. cooled, elec. start, ex. cond., \$1,900. 282-3307 or 486-4016.

10-spnd. bike, \$40, OBO. David, x36647 or 526-3045.

### Boats & Planes

'86 18' center console, 90hp, SS prop, live well, troll motor, Sportsman trlr. 470-2718.

'72 30' Morgan sailboat, new diesel eng., \$17,500, OBO. Bill, 283-5384 or 326-1880.

'88 Larson 20 center console, 200hp Evinrude tandem axle trlr., loaded for offshore, will lease or lease/purchase, ex. cond. Mike, 333-6821 or 474-3637.

'79 Renegade 1540 ski boat, 140hp Evinrude, SST prop, custom trlr., ex. cond., \$2,500, OBO. 333-6868 or 486-7846.

### Audiovisual & Computers

IBM compatible computer, 512K memory, monochrome monitor, 101 key kb, 1 360K floppy, \$300; IBM compatible laptop computer, 512K memory, 2 720K floppies, 101 key kb, books, case, cables, \$500. Jerry, x35861 or (409) 945-8550.

Dram chip, 1 MB, 256 KB, 7 OMS, 36 qty., \$100/all. James, 487-3223.

Panasonic RK-P 200 C electronic typewriter

### Today

**BANN meets**—The Bay Area NAFE Network is sponsoring a membership drive meeting at 4 p.m. Jan. 11 at the Marina Via Club, Nassau Bay Hilton. BANN is the local chapter of the National Association of Female Executives. Cost will be \$2. For more information contact Jayne Rutledge, 282-6207.

**Cafeteria menu**—Special: Salisbury steak. Entrees: baked scrod, broiled chicken with peach half. Soup: seafood gumbo. Vegetables: cauliflower au gratin, mixed vegetables, buttered cabbage, whipped potatoes.

### Monday

**Cafeteria menu**—Special: beef and macaroni. Entrees: ham steak, Parmesan steak. Soup: chicken and rice. Vegetables: green beans, carrots, au gratin potatoes.

### Tuesday

**Cafeteria menu**—Special: Mexican dinner. Entrees: potato baked chicken, barbecue spare ribs. Soup: tomato. Vegetables: squash, ranch beans, Spanish rice, broccoli.

### Wednesday

**Cafeteria menu**—Special: baked meatloaf with Creole sauce. Entrees: baked scrod, liver and onions, ham steak. Soup: seafood gumbo. Vegetables: beets, Brussels sprouts, green beans, whipped potatoes.

### Thursday

**Cafeteria menu**—Special: smothered steak with dressing. Entrees: chicken and dumplings, corned beef with cabbage. Soup: beef and barley. Vegetables: spinach, cabbage, cauliflower au gratin, parsley potatoes.

### Jan. 18

**HSS meets**—The Houston Space Society will meet at 7:30 p.m. Jan. 18 at the University of Houston, Atlantic Rm. Michael Stanford will speak on "Impact of Space Radiation on Manned Space Operations." For more information call 639-4221.

**Cafeteria menu**—Special: tuna and salmon croquette. Entrees: pork chop with yam rosette, Creole baked cod. Soup: seafood gumbo. Vegetables: Brussels sprouts, green

beans, buttered corn, whipped potatoes.

### Jan. 22

**BAPCO meets**—The Bay Area PC Organization will meet at 7:30 p.m. Jan. 22 at the League City Bank and Trust. Call Earl Rubenstein, x34807, or Tom Kelly, 996-5019, for more information.

### Jan. 23

**Talking safety**—The SAFE Association is sponsoring a meeting at 5:30 p.m. Jan. 23 at the JSC Safety Learning Center in Bldg. 226N. Robert Brennecke will discuss "Occupational Exposures to Hazardous Chemicals in Laboratories." For more information contact Karin Porter at x33381.

### Jan. 24

**AIAA meeting**—The American Institute of Aeronautics and Astronautics will meet at 5:30 p.m. Jan. 24 at the Gilruth Center. Konrad K. Dannenberg, winner of the 1990 AIAA National Durand award, will speak. Members and spouses \$8; non-members \$9; and students/young members \$7. Dinner reservations deadline is noon Jan. 18. For more information, call 333-6064, 283-4214, 283-6000 or 282-3160.

### Jan. 30

**NCMA classes**—The National Contract Management Association and University of Houston-Clear Lake are sponsoring a course in negotiation of contracts. The classes will begin 8 a.m. Jan. 30-31 at the University of Houston-Clear Lake in the Bayou Bldg. Cost: \$100 per person. For further information contact Jean Stell at 283-3122 or 283-3120.

### Feb. 2

**AAS conference**—The American Astronautical Society will host the Rocky Mountain Annual Guidance and Control Conference Feb. 2-6 at the Keystone Lodge in Keystone Village, Colo. For information, call Alice Little at (303) 939-5147.

### Feb. 27

**Laptop showcase**—The information systems directorate is sponsoring a notebook laptop showcase

at 10 a.m. Feb. 27 in Bldg. 12, Rms. 112, 254, and 256. For more information call the Product Demonstration Facility, x37572.

### March 5

**Space conference**—The Space Foundation will co-sponsor the third annual Space: Technology, Commerce & Communications South-west conference March 5-7 at the Nassau Bay Hilton. For more information contact Roseann Tully at 617-862-7174.

### March 21

**NCMA seminar**—The National Contract Management Association will offer its semi-annual conference on March 21 at the Moody Civic Center, Galveston. The conference theme is "Managing Contracts for Peak Performance." For more information contact Lucy Yates, x31864 or Sue Garman, x35998.

### Apr. 23-26

**Space Congress**—The 28th annual Space Congress will be April 23-26 in Cocoa Beach, Fla. The Canaveral Council of Technical Societies will host the conference with a theme of "Space Achievement—A Global Destiny." For more information contact Stuart Shadbolt at (407) 383-2200, x2202, or John Glass Jr. at (407) 383-2200, x2207.

### May 3

**AACE workshop**—The American Association of Cost Engineers Houston Gulf Coast Section will present its annual spring workshop May 3-4 at the Hobby Airport Hilton. Dennis Lawler of JSC's Intelligent Systems Branch, will be one of several speakers. For more information, call Ralph O'Neal at 492-3922.

### May 22

**Space development**—The National Space Society will host the 10th annual International Space Development Conference May 22-27 at the Hyatt Regency on the Riverwalk in San Antonio. The theme is "Space: A Call for Action." Abstracts, due by Nov. 1, may be sent to Bob Blackledge, 6015 Eagles Nest Ct., Colorado Springs, 80918-1510. For more information, call Carol Redfield at (512) 522-3823.

w/4 color graphics, 2 KB mem., LCD display, \$100. Ted, 482-0092.

Commodore 128, modem, Star 1000C printer, 1571, 1581, 1526 printer, TV/monitor, printshop (7 disks), Newsroom, Personal Publisher, 50 disks w/over 1,000 prog., all or part, \$700, \$950 w/monitor. Rick, x33856 or 488-3527.

Zenith laptop computer, SW, books. Peter, 334-2081.

Apple IIe w/green monitor, modem, duodisk, imagewriter printer, 80 col. card, \$800. 326-1775.

AT&T 6300 computer, 20 meg HD, DOS 3.3, modem, optical mouse, SW, ex. cond., \$795, OBO. Jon, 282-5165 or 796-8225.

Bondwell Pro 8T laptop computer, 4.7-8.0 Mhz turbo, modem, batt. pack, 2-714 K disc drives, backlit superwrist screen, all ports, AC pwr. supply, \$795, OBO. Jon, 282-5165 or 796-8225.

El Gar batt. backup for computers, model SPF 880, rating 550 VA, ex. cond., \$300. Marie, x39309. Macintosh 512 Enhanced, 800 K drive, \$450. 280-8796.

### Musical Instruments

Console piano, Werleines, walnut fin., ex. cond., \$750. Jeff, x31974 or 286-1935.

Yamaha ME-10 kybd., ex. cond., \$800. Bob Luke, x38691.

### Pets & Livestock

Four Lhaso-Apsos pups, 1 F, 3 M, 9 wks. old, AKC, \$175/ea. (409) 345-4437.

Rabbits, mini-lops, New Zealand. Gailo, 554-6200.

AKC Pekingese pups, 3 F, 1 M, blk., fawn, blond, 4-8 wks., champion bloodline, \$250-\$300. Sharen, x49737 or B.J., 473-4645.

AKC Pekingese pups, born 12-9-90, 2 M red sable w/white feet, 4 point sire, champion bloodline, \$250. Sharen, x49737 or 473-6754.

AKC Doberman pups, whelped 12-23-90, red w/rust markings, prices start at \$300 nego., tails/dew claws clipped, shots, wormed, ready March 1. Ronnie, x31851 or 332-7501.

### Household

26" Curtis Mathis TV, stereos, couch/love seats, ent. stand, beds, dresser, desks, sewing cab., refig., W/D, pots/pans, dishes, microwave, tools, etc. 334-1165.

G.E. side-by-side frost free, 22 cu. ft. refig./freezer, 10 yrs. old, white, \$400, x32010 or 554-6743.

Sears 19" TV, new in box, rem., cable compat,

screen display, mem. and sleep controls, \$225. 482-8827.

King sz. ultra firm motionless wtrbd., oak w/under bed unit, 6 drws., padded rails, htr., sheets, pad, filler kit, ex. cond., \$275, OBO. 480-0150.

Beige sleeper sofa, \$200; DR table w/4 chairs, \$100; stereo w/dual cass., turntable, \$75; coffee/end tables, \$75; lamp, \$10, OBO. Bob, x33057 or 538-3431.

Apt. sz. W/D, ex. cond., \$295; full sz. bed, bed skirt, 2 sets sheets, comforter, pillows, \$170, OBO. x38385.

Modern beveled-edge rectangular glass-top DR table w/cream colored marble fin. trestle base, purchased from Ethan Allen, \$280, OBO, ex. cond. Katie, x33185.

Twin sz. spring air ext. firm matt., box spring, ex. cond., hdbd., ftbd., frame, \$40. 286-0910.

Queen sz. hide-a-bed, love seat, 3 tables, \$400; antique green full sz. bed w/mirror dresser, 5 drws., chest, 2 night stands, \$750; G.E. dishwasher w/pot scrubber, needs adjustment, \$75. Magdi Yassa, x33479 or 486-0788.

Sofa, matching love seat, beige, good cond., \$150, lg. stuffed chair, 2 matching side tables, earth tones, good cond., \$150. 333-4379.

Recliner, like new, \$80. Edward, x36250.

### Wanted

Want roommate to share lg. house in Sageglen, \$270/mo., util. incl. Eric, x38420 or 484-9179.

Want quality tool chest on casters, 70-100 quart ice chest, Genie AT90 or AT90-1 gar. door opener. 332-0365.

Want radial arm saw. 337-3122.

Want riders for vanpool starting from SW side and Braeswood-610 locations to JSC. Chau, x31451.

Want alumni in Houston area for the Embry-Riddle Aeronautical Univ. Houston Alumni Chapter. Jeff, 282-6644 or 484-4956.

Want scuba gear for man, suit, BC, regulator, etc. 280-8796.

Want 2 roommates to share lg. 4-2-5-2 house, min. to JSC, non-smokers, \$300/mo. plus 1/3 util. 474-5106.

Want licensed racers for motorcycle endurance road racing team, motorcycle provided but you must share expenses. Mark, x35211.

### Miscellaneous

IBM correcting typewriter, good cond.,

recently serviced, \$300. Jerry, x35861 or (409) 945-8550.

Quality rowing mach., \$75; 6hp Johnson motor, ex. cond., \$395; toilet w/seat, \$20; modem, \$50; solid wood door, \$40; 50 Play Boy magazines, \$20. 332-0365.

Ladies matching ski jacket, bibs, sz. 10, Comfy brand, ex. cond. \$75. 326-2754.

2 Wilson Profile tennis racquets, 95 sq. in. surface, \$140/ea or \$250/both. Kyle, x38653 or 532-1130.

Pair of auto rooftop carr. bars, \$15; walking cane, \$5; metal crutches, \$10. 482-8827.

Lg. office desk, ex. cond., 2.5'x5', wood, veneered, 3 drws. on right side, 2 drws (1 file dvr) on left, \$160. 996-8357.

Greenhouse, 12'x8', fiberglass/wood, fan w/thermostat, \$95. Jeff, x31974 or 286-1935.

Ski the Summit, CO trip for 2, incl. round-trip airfare, 5 nights lodging, rented van, 4 day ski the Summit lift tickets, Feb. 27-Mar. 4. Jose, x30373 or 480-1899.

50 yr. old solid oak church pew, 6' in length, can be shortened, \$100. x30021 or 479-7947.

Art easel, Italian blankets, playpen, \$25. 286-0022.

Soloflex wgt. mach., incl. butterfly, leg ext, wghts., ex. cond. Kirk, 282-2911 or 332-5876.

Bodyguard stat. exer. bike, \$70; rowing mach., \$40; trampoline, \$5; ankle wght

# Command Performance

## Chief Astronaut Dan Brandenstein paints a portrait of the shuttle as seen from the commander's seat

(Continued from Page 1)

**E**ighty NASA cameras still focus on the shuttle at 150,000 feet, two minutes and 10 seconds after launch, when the solid rockets burn out. From the ground, they appear to fall away like arrows at the height of their flight. The spacecraft is moving more than four times the speed of sound.

"When the solids go, you feel a dip," Brandenstein says. "It feels like you're falling for just a second. After SRB sep is past, it gets so smooth. I always refer to it like a sewing machine. It just kind of purrs."

"My first glance out the windows on a flight was right after the roll program," he recalls. "You look out then to check for debris going by the windows. The sky was still blue. The second glance after that, there was a little bit of blue, but the sky was mostly black."

For six and a half minutes after the solids have expired, the main engines continue to burn, pulling fuel from the external tank at a rate that would drain an average swimming pool in less than nine seconds. To those watching, it is simply streaking toward space, continually climbing, constantly accelerating and slowly disappearing. But to those flying, it is passing through boundary after boundary, climbing safety-net stairs to orbit.

"You are always busy monitoring systems," Brandenstein says. "Your concentration on trying to keep track of options does decrease some, though it is more like it shifts. When you pass the negative return call, you don't have to worry about a return-to-launch-site abort. That's one less thing you have to worry about, so you kind of flush that."

"Then, when you get the press-to-main engine cutoff (MECO) call, well, your transatlantic aborts are gone, so you kind of relax on that," he says.

"We're comfortable with the whole system as we have it now," Brandenstein says. "As long as you can override something that's automated if it isn't doing the right thing, and as long as you can do that before it puts you in a situation that you can't recover from, then automating things is better."

When the main engines cut off, the shuttle is about 70 miles high and traveling around 17,400 miles per hour. But the sensations in the front left seat say it may as well be sitting still.

"What's really strange is that when the engines cut off, your arms just float up," Brandenstein says. "It doesn't feel like you stopped. The Gs build up the most right before MECO and you're being pushed back, but you aren't thrown forward in your straps when the engines shut down. The acceleration that pushed you in the seat is gone, and you're just floating."

Energy, though it can't be touched or held in a hand, exists, in one form or another, before it is used and after it is used. The 44 million horsepower per second put out by the solid rockets are still within the shuttle. The 23 Hoover Dams per second of the main engines have been imparted to the spacecraft. All that remains to put the shuttle in orbit now is a slight boost, a baby step in comparison to a sprinted marathon, without which the spacecraft would descend as quickly as it rose. The orbital maneuvering system engines are a fine-tuning mechanism, easing the shuttle into a free-fall around Earth, too fast to come down, too slow to go higher, with a gentle push rarely longer than a couple of minutes.

"Relative to the sensations of ascent, the OMS burn is not much," Brandenstein says. "But it is very noticeable. Once you've been in zero-g for a while, any burn is very noticeable. You're more sensitive. The burn is a bit of a jolt when it starts, and it's just a smooth, gentle acceleration after that. You don't really see yourself get any

higher. It is so gradual; you do a burn on one side of the Earth and you don't really see that you're any higher until you're half an orbit away."

"It isn't really until the pre-sleep period on the first day when you can really kind of relax and say, 'We're all caught up; We got today done,' he says. "Then you can spend more time looking out the window, and you can eat a slow meal. In fact, for lunch on the first day, we usually just carry a bag of sandwiches we can eat on the run."

Brandenstein's first flight, STS-8, launched at night. The shuttle reached orbit in darkness, and created its own new day within a few minutes.

"We launched at night, we crossed the Atlantic at night, and just as we got to Africa, we saw the first sunrise," he says. "Of all three flights, seeing that first sunrise is something that's most memorable to this day. In your training, you get briefed on what things are going to be like: 'ascent is going to be like this.' But no one ever said how phenomenal those sunrises were."

"Sunsets and sunrises happen very fast," Brandenstein said. "At sunrise, you see a sliver of sky turn blue, and then you get this tremendous spectra of color all along the horizon. The colors are just so vivid and so bright that it is really amazing."

To the Earth-bound, the shuttle in orbit is at best a twinkle crossing from horizon to horizon at dawn or dusk, and it is seen then only if conditions, location and timing fall correctly.

"Through your training, you develop this teamwork," Brandenstein says. "Mission Control is there and is another part of the team. You're part of the team. You don't ever feel alone. I have never felt anything like that on orbit. But you don't feel like they're right next door to you, or like they are always looking over your shoulder, either."

"You have to have what we sometimes refer to in the flying business as 'situational awareness,' he says. "You have to know what's going on all around you. You have to have a big picture of all the systems on board. But, then again, by the time we fly, we've been trained by so many experts that we also have a very intimate knowledge of each particular system."

"I sleep on the flight deck," he says. "If something happens during the night, you're right there ready to respond. I sleep in the seat so the rest of the crew can sleep downstairs. If there is an alarm, the controls are right there. You can get to it quickly and not disturb the whole crew, especially if it's something that's not very significant."

Flight in orbit is not flight, although it is called that for lack of a better word. Movements of the shuttle in space are adjustments made to a perpetually falling object through the use of 38 primary jets, six small jets or the two large OMS engines. The wings are simply waiting. Due to the unnatural feel of orbital mechanics, flight is now a precise calculation of cause and effect more than it is a human feel for what will occur and why.

"You don't have a sensation of speed such as driving fast down the road, because poles aren't whizzing past you, you aren't hearing the rumble of wheels on the ground," Brandenstein says. "You're in a silent environment other than the cockpit noise, and the only sensation you

have is when you look out the windows and see the ground tracking below you. But to see continents come and go, to take on the order of 10 minutes to cross the United States, it's obvious you're really humming."

The only time the shuttle's speed is constant is when it is in orbit. To go from zero to almost 18,000 mph in eight and a half minutes is a feat, but the bigger feat is to go from 18,000 mph to zero and remain intact. To designers, crew and flight controllers, it is called a high angle of attack; its nose is angled high, and its most durable portion, the tiles underneath, greet Earth first in a battle between air and speed.

"The deorbit burn feels just like the OMS burn on ascent," Brandenstein says. "But as soon as you're done with it, you pitch around to get the nose forward and up. Then, as you start your fall toward the atmosphere, you do notice that you're coming down. It looks like you are getting closer to the Earth. But you normally go into night very quickly, and then your visual cues are gone."

"Then, in darkness, the first sensation you get is when you are a bit into the atmosphere and the Gs start building up," he says. "It still doesn't feel like a descent; it feels like being in an airplane and pulling Gs. It just feels like you're squishing

down in the seat. "From the sensations, without instruments, you wouldn't know the difference between Mach 25 and Mach 1," Brandenstein says.

The shuttle's entry is automated from deorbit burn

through three gradual, sweeping S-turns, one of which can take half an ocean to complete. The atmosphere is the only brake it has to slow it from Mach 25 to 200 miles an hour. The friction between air and spacecraft produces temperatures of almost 3,000 degrees Fahrenheit. To release the energy it received at launch, it creates a spectacle on entry.

"You don't get used to seeing the plasma build up," Brandenstein says. "At about 350,000 feet, you start to see a little pink out of the windows, coming up from the bottom."

"It turns into kind of a pink glow, and, from that, becomes an orange glow," he says. "It then becomes a very deep orange, before it turns practically white—it is so hot. In fact, on the corners of the windows, you can see a turbulent flow with swirls in it. It's sort of like rain on the car window, but it isn't drops, it's a flow pattern."

"Then at about 180,000 feet, it goes in reverse: the white gets less dense, then it goes to orange, then pink and then it's gone," Brandenstein says.

"During this phase, you come into daylight," he says. "The Earth is still dark, and the upper part of the sky is still dark, and in those areas you can still see the plasma. But where the sun is rising, you can't see it because of the light background. On both extremes, you have the orange, pinkish plasma. In the middle, you have a blue stripe where the sun is coming up. It only lasts a few seconds."

"You've trained to the point where you know that if you had to take over, you could do it," Brandenstein says. "But you don't even hold your hand on the stick all the time during entry. You are just monitoring systems, cycling through displays on the screens, and checking them against your checklist cards. It's a very close analogy to an airplane on autopilot, though you

are monitoring things very closely.

"When you see the Sun come back up again, it's obvious that you're much lower than you had been," he says. "But even then, when you break out of night, you don't have a sensation of going down. You still feel mostly just a forward velocity."

As the shuttle descends and slows, the jets that have kept it stable are replaced by the rudder and elevons for control. Flight becomes flight again in the traditional sense.

"You don't hear wind noise, and you don't hear much of anything except what is coming through your headset. You don't notice the change from the jets to the aerosurfaces; it's very subtle," he says.

"When we go subsonic, at about 60,000 feet or so, we take over manually, flying it around the heading alignment circle all the way to touchdown," Brandenstein says. "That way, when you get to the landing phase, you're in tune with the vehicle."

"On first landings, almost everyone notices a sort of time compression," Brandenstein says. "The events seem to happen faster than they did in the simulator or in the Shuttle Training Aircraft. The STA is very accurate in duplicating the shuttle, so your landing feels very much the same; you feel like you've done it before. The time compression is probably due to anxiety, because it doesn't seem to happen the second time you land."

"The shuttle goes through 'mach buffeting' as it goes subsonic," he says. "It's a shaking kind of like a car going down a gravel road, due to air transitioning from supersonic to subsonic flow over the wings, and it lasts about 10 to 15 seconds."

"I've flown 747s and the KC-135, which are big airplanes," he says. "In them, you have a certain lag in the responses. But the shuttle flies more like a fighter than a big airplane. You know you are flying a large aircraft, but the controls are positive and crisp."

"You don't get much of a sensation of descent until you drop the nose on final," Brandenstein says. "The approach pattern is much different than a fighter, carrier approach or anything else. In the shuttle, you have no power, and most of the time you're constantly decelerating. On the outer glide slope to the runway, maintaining a constant speed of 290 knots, and it's pretty steep. You're kind of hanging in the straps then. You keep your speed constant by opening and closing the speed brake. You feel the speed brake take hold and you feel the drag in general."

On its final approach to the runway, the shuttle descends seven times more steeply than a commercial airliner. It is dropping from the sky 20 times as fast. Less than 2,000 feet above the runway, it pulls up to reduce its angle of descent to just slightly less than that of an airliner. Its final maneuver before touchdown is a slight flare upward of the nose, to slow it even more and allow a gentle easing down of the nose landing gear after the main gear has touched Earth.

"You don't feel the final flare," Brandenstein says. "The only big difference on touchdown is between the lakebed and the concrete runway. Rollout on the runway is much smoother. The lakebed is pretty rough."

"If you bring it to touchdown right, you hardly notice it," he says. "It's smoother than a landing in a commercial jet."

"It is being a part of a team that accomplishes a mission that you remember," he says. "That's the whole thing. You take it in steps. You're proud of your part in it; you're proud of your crew; you're proud of everyone that worked on the flight; and you're proud of the whole team that made the shuttle perform. When you walk away and you're all done, that's what you remember and that's what really makes you feel good."



# JSC managers earn Meritorious Executive Awards

(Continued from Page 1)

In 1979, he was named deputy chief of the Astronaut Office.

Nebreg, who has been associate director in charge of day-to-day center operations since 1989, joined JSC in 1963 as an aerospace engineer in the Apollo Spacecraft Program Office. He held positions of increasing responsibility in the Apollo and space shuttle programs until he was named executive assistant to the associate administrator for space flight at NASA Headquarters in 1976. He returned to JSC as deputy manager of the Orbiter Project Control Office in 1978, and after two more promotions became deputy director

of administration in 1983. He became executive assistant to JSC Director Aaron Cohen in 1987.

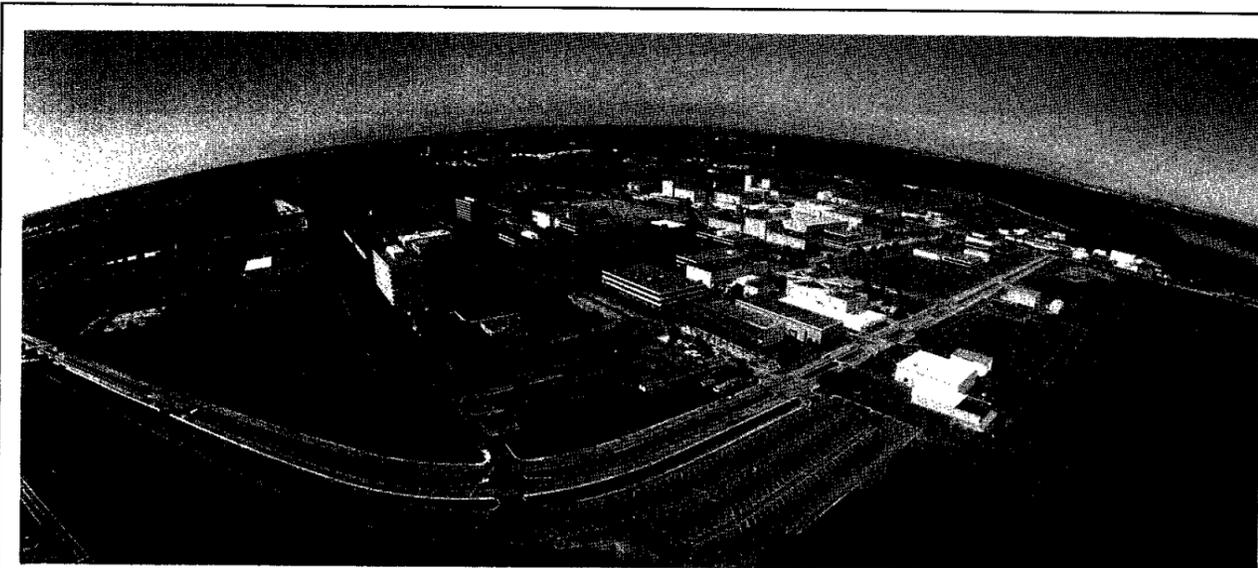
Kelly has been director of administration, managing all business aspects of NASA's programs at JSC, since 1986. He began his JSC career in 1962 as an aerospace technologist in the Mercury Project Office, and held numerous positions of increasing responsibility in the Apollo program office and Administration Directorate, and in 1972 was named special assistant to the director for management. He was named director of administration and program support in 1981 and director of center support in 1983.

Huntoon, who has been director of Space and Life Sciences since 1987, manages medical research and operations for all manned space flights, life sciences experiments probing the effects of space on humans, physical science investigations of extraterrestrial materials, and spacecraft habitation design, development and provisioning. She joined JSC in 1970 as a senior physiologist in the Biomedical Research Division. She was named chief of the Space Metabolism and Biochemistry Branch in 1976. She became chief of the Biomedical Laboratories Branch in 1977, and associate JSC director in 1984.

Berry, who has been director of Information Systems since the new organization was formed in April 1990, is JSC's senior information resources management official. He was nominated for the award while director of Mission Support, a job he accepted in 1985. He joined JSC in 1962 as an aerospace engineer in the Flight Operations Directorate. He was named chief of the Lunar Mission Analysis Branch in 1969, and chief of the Mission Planning and Analysis Division in 1976.

Thorson, a co-located Headquarters employee, returned to JSC in 1989 when the Space Station Freedom Systems Integration Office

was established here. He began his NASA career at JSC in 1966 as a control system engineer for computer software on the Apollo lunar landing module. In 1974, his responsibility expanded into all areas of shuttle software. In 1980 he was promoted to manager for Vehicle Systems Integration, and in 1984 he became Technical Editor of the Space Station Phase B Request for Proposals and manager of the Space Station Data Management and Operations Office. In 1986, he became NASA deputy manager for operations of the National Space Transportation System at Headquarters.



JSC Photo by Jack Jacob

**WIDE WORLD OF SPACE FLIGHT**—This aerial photograph provides a new perspective on JSC and its surroundings, looking north from Clear Lake. The photo was taken with a Widelux camera, which has a lens that moves from side to side to enable it to provide a 150-degree field of view. Each exposure is about three Hasselblad film frames wide. The wide lens rotation exaggerates the curvature of the Earth.

## Security reminds badges should be seen, not hidden

By Pam Alloway

The JSC Security Division has issued a reminder that badges are for wearing, not carrying or leaving at home.

And within the next few days, security officers will begin increased random badge checks in all JSC buildings on and off site. Officers will send people who do not have their badges to the closest badge office to obtain a temporary badge for the day. Physical Control Zone (PCZ) badges are not valid substitutes.

NASA installations are required to regulate visits and control visitors to their installation, said Debra Griffin, security specialist. Badges are required for all official visitors and employees who either work in or visit any JSC building or facility. Security issues the badges for identification and employees should wear them at all times when working in JSC buildings. The badge also serves as an official government identification card.

Many people bring their badges to work, but do not wear them, security officers said. Placing the badge in a pocket is not sufficient. Security personnel suggest wearing the badge on a chain or necklace if the employee does not have a place to attach it on his or her clothing.

Situations in which badges are not required are: in areas that are open to the public; cafeterias; working outside on construction sites; or working with aircraft or machinery where safety is a concern.

The Security Division reissues badges when: security clearance requirements change; an employee's name changes; facial characteristics change substantially; when the badge is lost, stolen or significantly mutilated; or to comply with authorized officials' requests. Employees should turn in their badges on termination or upon receiving a replacement badge. Service pins and other objects should not be attached to any NASA or JSC badge. Badges should not be worn outside the work place.

The message is simple, said security personnel: Wear your JSC badge where it can be seen, at or above the waist, facing forward.

## NASA awards contract for Endeavour drag chute

By Pam Alloway

NASA has modified its space shuttle production contract with Rockwell International Corp.'s Space Division to include the design, fabrication and installation of an orbiter drag chute system on Endeavour.

The total price of the modification is \$33.3 million. The total OV-105 production contract, including the drag chute modification and support by all other shuttle-related contractors, is \$1.8 billion. The drag chute system work will be performed at

Rockwell's facilities in Downey and Palmdale, Calif.

The drag chute system is part of NASA's continuing program to upgrade the shuttle's operational capabilities and flight safety. The system will improve the landing capabilities of space shuttles.

The drag chutes are specially designed parachutes deployed from the shuttle's aft end to supplement the braking system and help slow the vehicle's speed after the orbiter has landed on a runway. Drag chutes

on Endeavour and other shuttles will permit them to land in shorter distances and also help reduce brake wear. Endeavour is expected to make its first flight in early 1992.

The orbiter drag chute program is managed by JSC. Also participating are Rockwell International Corp.'s Space Division which designed the orbiter drag chute system; Irvin Industries of Santa Ana, Calif., which designed the parachute; and the Boeing Airplane Co., Seattle, which designed the modifications to the B-52 test aircraft.

## Expert compares Total Quality Management to rocket launch

(Continued from Page 1)

showed America lagging behind other countries in almost every category and Japan leading in most.

The only category in which the U.S. leads, according to Grayson, is Purchasing Power Parity, a measure of individuals' spending power that adjusts for currency rates. But, he said, unless America increases its productivity growth rate from the negative 0.7 percent of 1989, it cannot hope to hold onto its standard of living lead.

"We haven't lost. We still are No. 1 in level of productivity, but we are losing," he said. "This nation has a crisis in terms of its economic leadership in the world and unless we change we're going to lose that position. What I'm saying is no matter where you are, no matter what level you are... you can do better."

Grayson, who admitted he isn't intimately familiar with the space program but boasted of being a co-founder of the Buck Rogers Fan Club some 60 years ago, said TQM can work for NASA but the going may seem slow at first.

"It gets frustrating at times," he said. "You'll get irritated. You won't like some of the things that are going to happen. You'll get discouraged because the old way is more comfortable."

"I compare it to a rocket launch. That rocket sits there and it trembles for a while and it doesn't seem to move and everybody holds their breath. Then it slowly begins to go up and after it gets going, it shoots off at Mach speed. I think that's the way TQM can do, too."

Grayson said that in every case he's seen TQM successfully installed, management has become better and easier. Some additional work and expenses are required at first, but once the TQM ethic has been adopted by everyone in the organization, the work becomes easier. Time starts being spent on improvement instead of dealing with crises and command problems.

TQM addresses quality in a broad sense, from process to product with emphasis on performance, schedule, reliability and service, he said. It requires structure, planning, goals, measurement, leadership,

empowerment and commitment.

TQM is aimed at people, teaching them how to do their jobs better, giving them the power to make decisions at the lowest possible levels. And it increases effectiveness and efficiency, allowing things to be done "better, faster, cheaper," he said.

Pitfalls to avoid include giving token management involvement, trying to implement TQM without making structural organization changes, failing to provide adequate and appropriate training, giving employees only token power, setting sights too low, not taking adequate measurements, not having sufficient communication, and failing to address the natural questions of "What's in it for me?" "What is it?" and "How can I do this on top of all my other work?" Grayson added.

In contrast to other productivity improvement programs, TQM uses quality to inspire everyone in the organization, he said.

"Productivity doesn't inspire most people," he said. "They think it's squeeze down, work harder, work faster, etc. Quality uplifts people with pride in work."

## Fisher: Working at NASA a privilege

(Continued from Page 1)

activities to successfully repair the satellite. The first of these spacewalks was the longest in history.

At NASA, Fisher's work has included high altitude research on the WB57 aircraft, astronaut office representative for the extravehicular mobility unit and EVA procedures and development, support crewman for STS-8, capsule communicator for STS-8 and STS-9, chief of astronaut public appearances and the manned maneuvering unit jet-



powered backpack development team.

His most recent assignment was to co-chair, with NASA robotics expert Charles R. Price, the External Maintenance Task Team for Space Station Freedom.

In his letter of resignation Dr. Fisher stated, "It has been both an honor and a privilege to have served as a NASA astronaut over the past 10 years. I know of no higher purpose, and have met no finer people. I wish you every success in the future."

## Space News Roundup

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## Computer contract extended

NASA has extended a contract with Computer Sciences Corp. of Houston to provide JSC with computer support through Dec. 31, 1991.

The amount of the one-year extension is \$37.4 million. The total estimated contract value, including the one-year extension amount, is \$230.8 million. The basic contract term began Jan. 1, 1988.

The work will be performed at and nearby JSC. The contract requires Computer Sciences Corp. to provide maintenance, operations and systems engineering of the center's automatic data processing facilities, networks and work stations. The contractor also will provide help desk services to the users of the center's ADP equipment.

## Certified secretaries join professional ranks

Thirteen new Certified Professional Secretaries were honored recently at the second annual JSC luncheon for all 40 of JSC's CPSs.

JSC Director Aaron Cohen expressed his appreciation for the group's efforts and acknowledged the vital role secretaries play on the JSC office team.

The newly certified secretaries are: Estella Gillette, Charlene Gemar, Lynn Ross, Mildred Williams, Mary Nordin, Elaine Kemp, Terry Gailey, Doris Roberts, Lori Green, Nancy Cogan, Judith Stovall, Linda Dunn and Carol Young.

CPS is a certification administered by the Institute for Certifying Secretaries of Professional Secretaries International. CPSs must pass a two-day examination testing their knowledge of business law, economics and management, behavioral science, accounting, office technology, administration and communication. Upon certification, JSC secretaries receive an \$875 cash award.

JSC's Human Resources Development Branch offers preparation classes throughout the year in a November-April set and a June-November set. For more information about the JSC program, contact Estella Gillette at x33077.

The Houston Area CPS Society of Texas will host a banquet for all new CPS holders on March 16.